

REMARKS

Claims 1–19 are pending. Claims 1–19 stand rejected. Claim 19 is being amended. Applicants respectfully traverse the rejections and request reconsideration.

35 U.S.C. §102 Rejections

Claims 1 and 6 stand rejected under 35 U.S.C. §102(e) as being anticipated by Hoof, U.S. Pat. No. 7,203,193 (hereinafter “Hoof”). Applicants respectfully disagree for the reasons set forth below.

Applicants’ Claim 1 recites, “*input queues...output queues...a switch fabric coupling said input queues to said output queues...[and] storing cells based on output queues.*” The Office Action at page 2 states that Hoof’s equivalent of a switch fabric “store[s] incoming packets with a buffer,” citing Hoof, Fig. 4, element 42, anticipates the cited elements of Applicants’ Claim 1. Applicants respectfully disagree.

Hoof discloses an ingress control unit (ICU) coupled to a packet buffer unit (PBU) further coupled to an egress control unit (ECU). *See* Hoof, Fig. 1. Packets enter the ICU through input ports 20 and are directly forwarded through the ICU to the PBU. Once packets arrive at the PBU, the packets are immediately stored in a PBU data memory 40, which has a disclosed purpose of “storing packets received from the ICUs 10.” *See* Hoof, col. 4, lines 29–31. Hoof further discloses that the PBU includes a PBN buffer 42, which stores entries that include “an address...of a memory location where at least a portion of the packet is stored [in the data memory 40].” *See* Hoof, col 4, lines 44–49.

As soon as Hoof’s PBU receives a packet from the ICU via the input ports, the packet is stored in the PBU in a data memory 40, then the memory location is entered in the buffer 42 in the PBU based on the address where the memory is located. Only after the packet is stored in the memory and buffer does the PBU transmit a notification message to Hoof’s ECUs to determine if any ECU is interested in receiving the packet stored in the PBU. *See* Hoof, col. 3, lines 57–67.

From that point, Hoof’s subscription/notification model, in which incoming packets are stored and retrieved only if needed, is active. This model, however, does not store packets in Hoof’s PBU based on which ECU wants them. Such storage dependence would not be possible

because the subscriber ECUs might change over time. For example, if ten ECUs subscribed to receive a packet from the PBU, then, later, five discontinued their subscriptions while five new ones activated subscriptions, the storage would not change, either in storage memory location or substance of what was being stored, because any such changes would disrupt the subscription service already in place for the first five ECUs.

Thus, Hoof's PBU does not store packets based on any information from the ECU, because not until Hoof has already stored the packets in the PBU are the ECU(s) notified that the packet even exists and because changing storage would potentially adversely affect subscription service for some ECUs. Therefore, Hoof's PBU stores packets based on the address where the memory is located; Hoof, however, fails to disclose "*input queues...output queues...a switch fabric coupling said input queues to said output queues...[and] storing cells based on output queues,*" as recited in Claim 1.

Due to the subscription/notification model used by Hoof, a person having ordinary skill in the art would not be motivated to modify Hoof to make the storage of packets at the PBU be based on Hoof's egress ports because such a modification would change Hoof's principle of operation. Because of Hoof's subscription/notification model, Hoof's PBUs do not care about the status of the output queues at Hoof's ECUs, because the role of the PBU is to store a data packet immediately without any further information. At a later point, after storing the packet at the PBU, the PBU can notify ECU(s) that they can subscribe to the PBU if the ECU wants the stored packet. The principle of operation of Hoof's subscription/notification model is to maintain storage of packets at a PBU separate from the functionality of ECUs, thus allowing Hoof's model to maintain its efficiency because it only performs processing associated with the packets stored in a PBU on an as-needed basis after notification by an ECU.

Moreover, in response to Applicants' arguments from the Office Action filed July 16, 2009, the Office states its reasoning for maintaining the rejection of Claim 1 ("*said switch fabric storing cells based on [the] output queues*") is based, in part, on an interpretation that "[t]he PBU is storing the packet based on the booking message from the ECU and that message is based on the queues space in the ECU." However, as presented immediately above, the PBU stores the packet before any ECU has requested a subscription. Thus, no storing is based on a booking message, only transmission from storage is based on a booking message.

Since Hoof does not disclose all the elements of Claim 1, Applicants respectfully submit that the rejection of Claim 1 under 35 U.S.C. §102(e) is improper and should be withdrawn.

Dependent Claim 6 inherits the foregoing patentably distinguishable elements of Claim 1 and should be allowed for at least the same reasons presented above in reference to Claim 1.

35 U.S.C. §103(a) Rejections

Claims 2, 3, 8, 9, 11, 12, and 17–19

Claims 2, 3, 8, 9, 11, 12, and 17–19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hoof in view of Chao *et al.*, “Delay-Bound Guarantee in Combined Input-Output Buffered Switches” (hereinafter “Chao”). Applicants respectfully disagree.

Claims 8, 9, 11, 12, and 17–19

Hoof’s principle of operation of its subscription/notification model is further directed to synchronizing notification messages transmitted from a PBU to an ECU (and vice versa), so as to allow for even distribution of messages and packets. *See* Hoof, Abstract.

Chao is directed to the direct transmission of packets across a switch from an input port to an output buffer, without intermediate storage at a switch fabric memory. Specifically, Chao’s performance gains are achieved when all cells arriving at inputs are “immediately forwarded” to outputs. *See* Chao, page 515, col. 1. Thus, if Hoof were combined with Chao as suggested by the Office, Hoof’s principle of operation would be substantially changed. If Hoof’s PBU were merely to transfer a packet from an ICU to an ECU (as in Chao) without first sending a notification message to an ECU inquiring whether the ECU wants the packet, then the ECU’s appropriate queue may not have enough space and the packet would be rejected or dropped completely, thereby losing data. The Office’s proposed combination would cause Hoof’s ECUs to receive packets directly forwarded from the inputs, resulting in burst-overload.

In addition, for such a combination even to exist, Hoof would have to be substantially modified completely to remove the PBU because Chao requires direction transmission of packets from an input port to an output buffer without any intermediate storage, as opposed to Hoof’s intermediate storage in PBUs. Such a modification of Hoof requires substantial reconstruction and redesign, as well as changes in the basic principle under which the Hoof construction was

designated to operate, as described above (Hoof's principle of operation). *See* MPEP 2143.01(VI) *citing In re Ratti*, 270 F.2d at 813. Thus, because the proposed combination would change Hoof's principle of operation, Applicants respectfully submit that the Office has failed to establish *prima facie* obviousness.

Claims 2 and 3

Claims 2 and 3 depend from Claim 1 and include the same elements of the claim from which they depend; thus, Applicants respectfully submit that dependent Claims 2 and 3 are novel and non-obvious for at least the reasons set forth above in reference to Claim 1 and further in view of the foregoing remarks regarding the combination of Hoof in view of Chao. As such, Applicants respectfully request withdrawal of the rejection of Claims 2 and 3 under 35 U.S.C. §103(a) and acceptance of same.

In view of the foregoing arguments, Applicants respectfully submit that Claim 8 is novel and non-obvious over Hoof, alone or in combination with Chao. Claims 9, 11, and 12 depend from independent Claim 8, include the same elements as the independent claim from which they depend, and are believed to be novel and non-obvious for at least the same reasons as presented above. As such, Applicants respectfully request withdrawal of the rejections of Claims 8, 9, 11, and 12 under 35 U.S.C. §103(a) and acceptance of same.

Independent Claim 17 includes similar elements as Claims 1 and 8 and is novel and non-obvious for the same reasons presented above in reference to Claims 1 and 8. Claims 18 and 19 depend from independent Claims 17, include the same elements as the independent claim from which they depend, and are believed to be novel and non-obvious for at least the same reasons as presented above. As such, Applicants respectfully request withdrawal of the rejections of Claims 17–19 under 35 U.S.C. §103(a) and acceptance of same.

Claims 4, 5, and 7

Claims 4, 5, and 7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hoof in view of Chuang *et al.*, “Matching Output Queuing with a Combined Input/Output-Queued Switch” (hereinafter “Chuang”). Applicants respectfully disagree.

Chuang, which is directed to a combined input/output queued switch, was introduced as a secondary reference against Claim 4 only due to a deficiency of Hoof regarding “determining an incoming cell’s priority based on the time of the cell departing from an output queue and the times of other cells in the output queue to depart.” Office Action, page 9, lines 6–8. Chuang was only introduced against Claim 5 regarding lowest time-to-leave scheduling, lowest time-to-leave blocking, and non-negative slackness insertion. Chuang was only introduced against Claim 7 for emulation of an output queued packet switch. Chuang does not cure the deficiency of Hoof regarding Claim 1, from which Claims 4, 5, and 7 depend, as described above (“*switch fabric storing cells based on [the] output queues*”). Therefore, Applicants respectfully submit that the rejection of Claims 4, 5, and 7 under 35 U.S.C. §103(a) is improper and should be withdrawn.

Claim 10

Claim 10 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Hoof in view of Chao and further in view of Chuang. Similar arguments apply for Claim 10 as for Claim 4, described above. As such, Applicants respectfully submit that Claim 10 is novel and non-obvious over the cited combination of art and the rejection under 35 U.S.C. §103(a) should be withdrawn.

Claims 13 and 14

Claims 13 and 14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hoof in view of Chao and further in view of Rojas-Cessa *et al.*, “CIXB-1: Combined Input-One-Cell Crosspoint Buffered Switch” (hereinafter “Rojas-Cessa”). Applicants respectfully disagree.

Rojas-Cessa, which was introduced as a reference against Claim 13 only for multiple virtual output queues, does not cure the deficiencies of Hoof and Chao regarding Claim 8, from which Claim 13 depends. Therefore, Applicants respectfully submit that the rejection of Claims 13 and 14 (depending from 13) under 35 U.S.C. §103(a) is improper and should be withdrawn.

Claims 15 and 16

Claims 15 and 16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hoof in view of Chao and further in view of Zhang, "Service Disciplines for Guaranteed Performance Service in Packet-Switching Networks" (hereinafter "Zhang"). Applicants respectfully disagree.

Zhang was introduced as a reference against these claims only for FIFO groups (Claim 15) and a plurality of crosspoint schedulers (Claim 16). Zhang does not cure the deficiencies of Hoof and Chao regarding Claim 8, from which Claim 15 depends. Therefore, Applicants respectfully submit that the rejection of Claims 15 and 16 (depending from 15) under 35 U.S.C. §103(a) is improper and should be withdrawn.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims, Claims 1-19, are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By Mark B. Solomon
Mark B. Solomon
Registration No. 44,348
Telephone: (978) 341-0036
Facsimile: (978) 341-0136

Concord, MA 01742-9133

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